Attribute Measurement System with Information Barrier (AMS/IB): Conceptual Description

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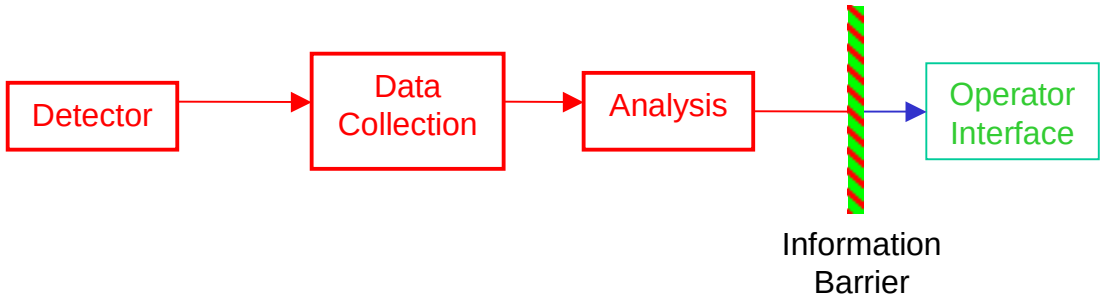
Outline

- Information Barrier (IB)
  - Goals
  - Basic concept
- Attribute Measurement System with Information Barrier (AMS/IB)
  - Design features and types of controls
  - Core design concept
  - Inspectability and authentication
  - AMS/IB elements and integration

Goals of an Information Barrier

- Allow meaningful measurements while preventing release of classified information
  - Only unclassified data are displayed
  - No access to classified data
- Assure monitoring party of the validity of these measurements
  - Unclassified output is accurate and authentic

Conceptual Information Barrier



Red = potentially contains classified data
Green = unclassified data in open area

Defense in Depth

- No single-point failure modes
- Combination of protection methods
  - Elimination
  - Substitution
  - Hardware
  - Software
  - Procedures
- Series of **simple** protective shells
- Minimization of quantity of classified data

Other Design Features

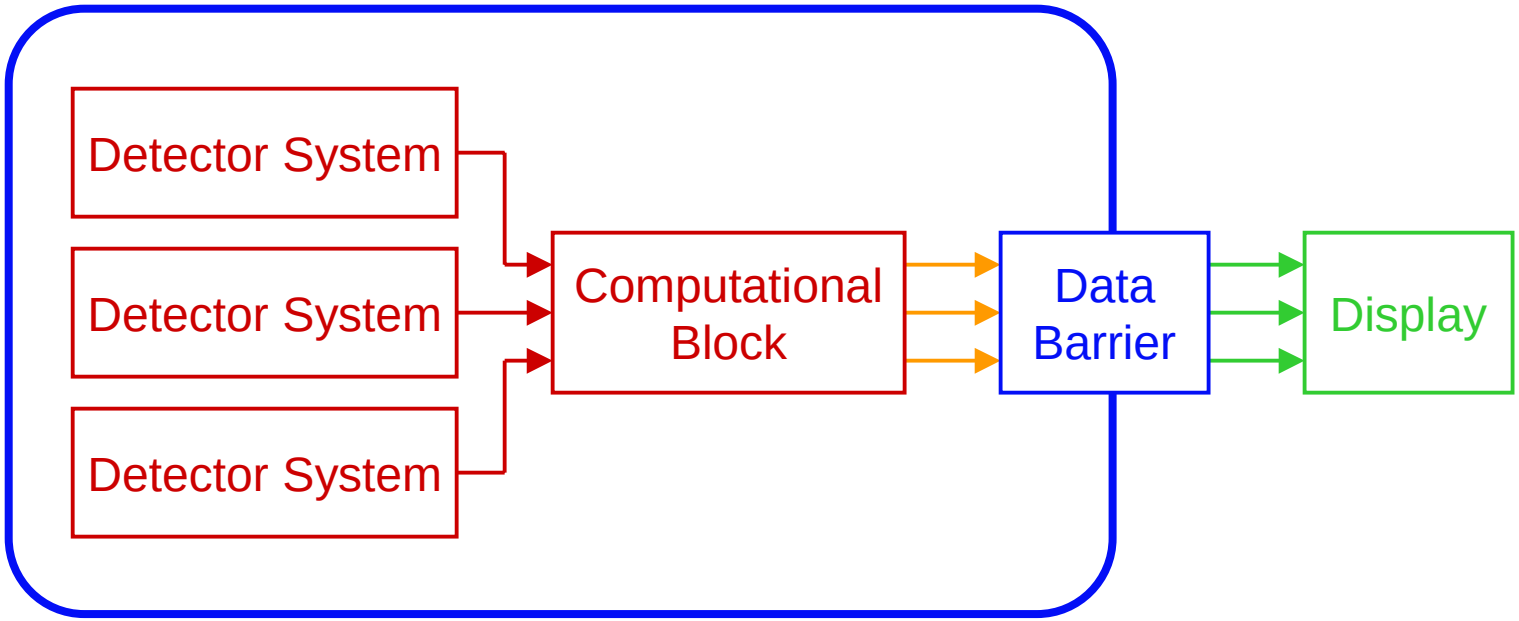
- Modular
  - Facilitates changes in detector systems or attributes
  - Avoids obsolescence
  - Facilitates maintenance (with identical modules)
- Ability to Authenticate
  - Classified measurements with secure system
  - Unclassified authentication measurements with open system

Open vs Secure Modes

Measurement	Mode
Background	Open or Secure
Calibration and Measurement Control	Open or Secure
Unclassified Assay	Open or Secure
Classified Assay	**Secure Only**

- unclassified measurements
- classified measurements

Core Information Barrier Concept



- potentially contains classified data
- unclassified data in protected area
- barrier elements
- unclassified data in open area

Inspectability

Simple Hardware	— easy
Complex Hardware	— difficult
Application Software	— time-consuming
System Software	— very difficult

Minimize Difficulty of Authentication

- Minimize number of difficult-to-inspect elements
- Minimize overall complexity
- Possibilities
  - Destroy used AMS/IB elements that might have once contained classified information
  - Present multiple copies of some AMS/IB elements for selection and use by the monitoring parties

Elements of AMS/IB

- Detector Systems
- Computational Block
- Security Switches
- Control Switches
- Security Watchdog
- Shielded Electronics Rack
- Data Barrier
- Display

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AMS/IB Elements Where Classified Data Temporarily Reside

- Detector Systems
  - Modular design
  - “Stand-alone” operation
- Computational Block
  - Simple element
  - Threshold comparison
  - Hardware or software implementation
  - Read-only memory

- potentially contains classified data

Protective Measures

Security Watchdog

- Controls all power to system
- Allows operation in “authentication” (unclassified) mode

Data Barrier—Filtering, isolation, and unidirectional transmission

Shielded Electronics Rack

- Physical security
- Emanations reduction
- Reduces opportunity for external control

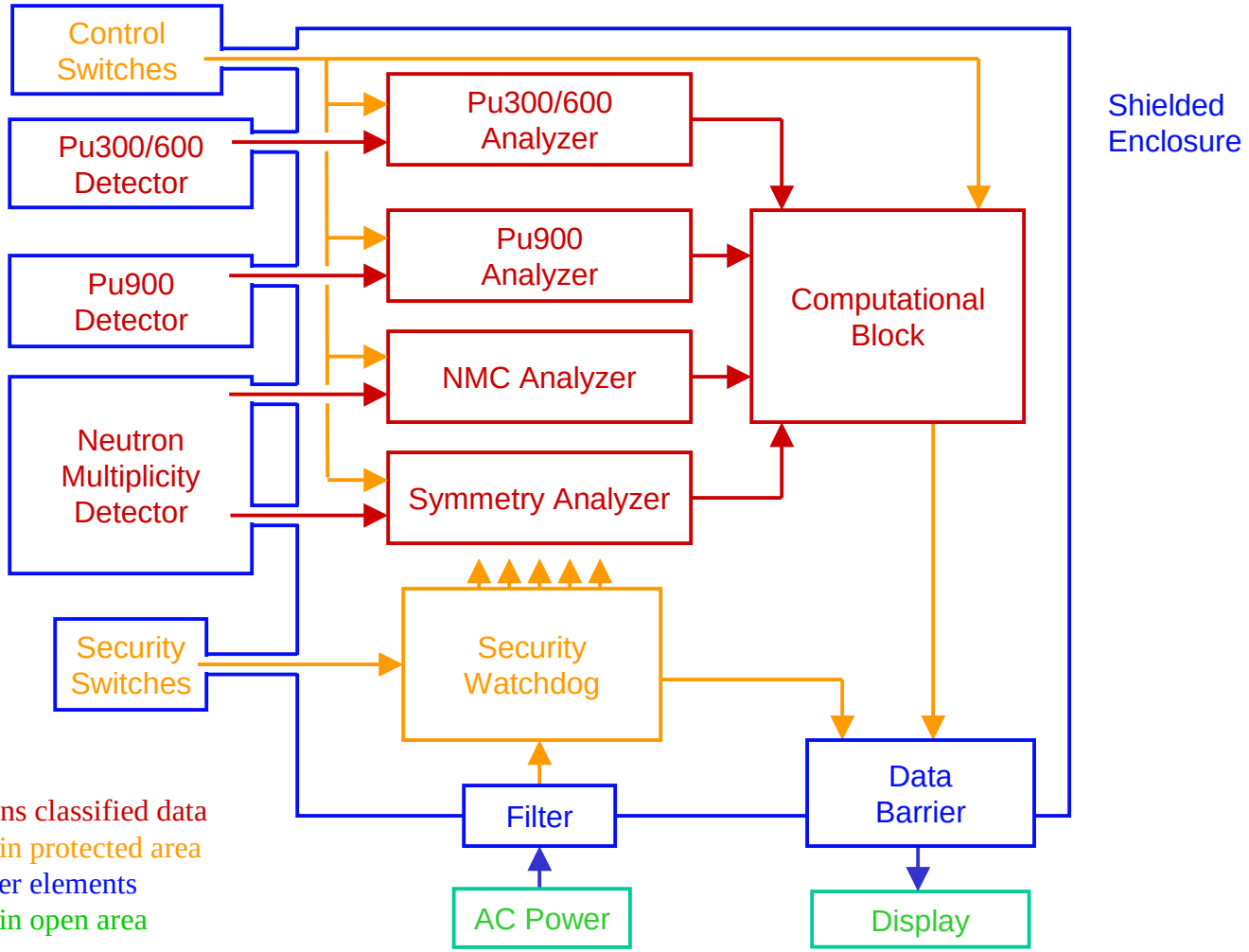
- unclassified data in protected area
- barrier elements

Input/Output Devices

- Switches
  - Detector control
  - Security
  - No communication between control and security
- Display
  - Simple—No complex data display
  - Output Only
- Unclassified Data Logging Possible

- unclassified data in protected area
- unclassified data in open area

System Integration Details



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Attributes and Detectors

Plutonium Presence	Pu300/600 System
Plutonium Isotopic Ratio	Pu300/600 System
Plutonium Mass	Neutron Multiplicity Counter and Pu300/600 Analyzer
Plutonium Age	Pu300/600 System
Absence of Oxide	Neutron Multiplicity Counter and Pu900 System
Symmetry	Neutron Multiplicity Counter